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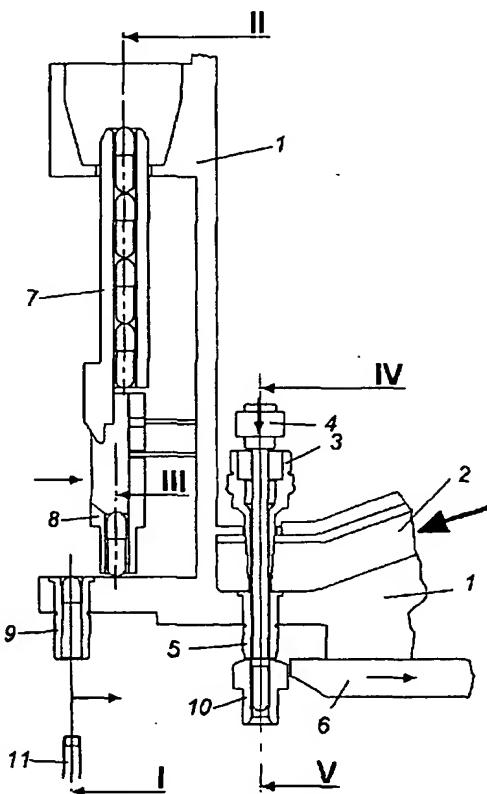
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(54) Title: **CAPSULES FILLING MACHINE TO PACK POWDER, HERBS, MICROGRANULES, PELLETS**



(57) Abstract: A capsule filling machine in which the products to be filled inside the capsules are fed hermetically from the inside of the rotating tower and are pushed in the withdrawal area of the dosing devices by the centrifugal force. The layer of the product to be packed, in the withdrawal peripheral area, has a minimum height and it allows packing even minimum product quantities. While working, the dosing devices are always immersed in the withdrawal peripheral layer and they do not come out from it even during the discharging phase.

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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**CAPSULES FILLING MACHINE TO PACK POWDER, HERBS, MICROGRANULES, PELLETS****INVENTION FIELD**

The present invention relates to the construction technique of capsule filling machines for powder, herbs, granules, pellets. INTERNATIONAL REFERENCE CLASS B65b.

**INVENTION STATE**

There are several capsule filling machines in which the dosing system is obtained by means of devices which enter the layer of products to be packed, withdraw a pre-set quantity of product and rise, coming out of the layer to introduce the dose in an empty capsule which is positioned over it

The problem to be solved is the realisation of an hermetic capsule filling machine in which the dosing devices are always inside the products to be packed, which can be treated even in minimum quantities distributed in layers having a reduced height.

The solution which is proposed by the present invention, overcomes the problems which are still present in the previous techniques, proposing a new class of hermetic capsule filling machines.

The invention is now described following the schematic figures of the annexed drawings, that are enclosed as a non-restrictive example.

Drawing no. 1 shows the partial radial section of a capsule filling machine which is equipped to produce capsules with powders or herbs. It is possible to notice that the group to feed and dose powder or herbs is mainly composed of details nos. 1, 2, 3, 4, 5 and 6 while the capsule feeding group is mainly composed by details nos. 7,8,9,10,11.

Drawing no. 1 shows the capsule feeder complete with the device to dispose the capsule with the top cap up, before being introduced in the opening device.

Drawing no. 2 shows the phase in which the already oriented capsules are introduced in to line with the opening device.

Drawing no. 3 shows the capsule opening phase during which the bottom is separated from the upper covering. In this drawings it is also possible to note that the dosing operation is in preparation; during this phase the piston no. 4 and the dosing device no. 3 start to move downwards.

Drawing no. 4 shows the transferring of the first partial dose, which is introduced in the bushing no. 5 below; it is possible to observe that the dosing piston no. 4 and the dosing device no. 3 continue to move downwards.

Drawing no. 5 shows the transferring of the first partial dose while the piston no. 4 and dosing device no. 3 have reached the lower point of their movement downwards.

Drawing no. 6 shows the piston no. 4 and the dosing device no. 3 that start moving upward after having released the first dosing in the bushing no. 5 below.

Drawing no. 7 and drawing no. 8 show the carrying out of the second partial dosing.

Drawing no. 9 shows the final phase of the dosing, when all partial doses are pressed on the lower contrast disc no. 6 by the piston no. 4.

In drawing no. 9 it is possible to observe that the bushing no. 10, which is supporting the capsule bottom, is arriving.

Drawing no. 10 shows the positioning of the capsule bottom in line with the upper bushing no. 5.

Drawing no. 11 shows the starting phase of dose insertion in the capsule bottom.

Drawing no. 12 shows the ending phase of dose insertion in the capsule bottom.

Drawing no. 13 shows the movement back of the capsule bottom, which has been filled with the dose, toward the closing device.

Drawing no. 14 shows the positioning of the full capsule bottom that is aligned with its own top cap.

Drawings nos. 15, 16, 17 and 18 show the closing and ejecting phases of the capsules at the end of the packing cycle and the capsule filling machine preparation to start a new working cycle.

In drawing from no. 1 to no. 18 the schematised capsule filling machine is equipped to fill capsules with powder or product having a similar granulometry.

Drawing no. 19 is a schematical representation of the five concentric circumferences (I; II; III; IV; V) along which the different operating devices are distributed.

Drawing no. 20 is a schematical representation of the product to be packed. It is possible to notice that in the left part there is an arrangement with dosing devices to pack powder or herbs, while in the right part there is an arrangement with aspirating dosing devices to pack micro-granules. It is possible to observe the central channel no. 12 for the products to be filled no. 2, which are pushed towards the peripheral parts of the rotating tower by the centrifugal force .

Drawing from no. 21 to no. 38 show the same schematised capsule filling machine equipped with modified dosing devices to fill capsules with micro-granules.

With reference to daring no. 21 it is necessary to specify that the device has slightly moved upwards in order to allow the passage of product no. 2 that is aspirated through the internal cannula of the piston no.

4 VACUUM. This aspiration allows the dosing of the micro-granules inside the device no. 3

In drawings from no. 22 to no. 26 it is possible to notice that the device no. 3 is always up during the aspiration in the internal cannula of the piston no. 4 VACUUM

In drawing no. 27 it is possible to observe that this device no. 3 has moved downward to its lower deadlock, while the micro-granules aspirated dose is kept inside the dosing device no. 4 VACUUM.

In drawings no. 28 and no. 29 it is possible to note that the piston no. 4 VACUUM, which contains the micro-granules dose move downwards and passes through the bushing no. 5 waiting for the arrival of the bushing no. 10 that supports the capsule bottom to be filled, and that the disc no. 6 has already moved away.

In drawing no. 30 it is possible to notice that when the bushing no. 10 is in line with the bushing no. 5, the piston no. 4 VACUUM stops the aspiration and the micro-granules can fall into the capsule bottom.

With reference to the drawings no. 31 and no. 32, it is necessary to specify that the micro-granules fall can be facilitated by air blowing.

Concerning drawings no. 33 and no. 34 it is possible to notice that, while the air blowing produces an useful cleaning operation, the capsule bottom, which is full with its micro-granules dose, move back towards the capsule closing device.

In drawings no. 35 and 36 it is possible to note that the VACUUM aspiration has started again and the device no. 3 has moved back to its withdrawing position while the piston no. 4 continues moving upwards.

In drawing no. 37 and no. 38 it is possible to observe that the piston has reached its upper deadlock to set the volume of the doses of the granules to be packed.

Drawing no. 39 shows a capsule which is still empty but closed.

Drawing no. 40 shows only its top cap.

Drawing no. 41 shows the capsule bottom without the top cap.

Drawing no. 42 shows the dose introduced inside the capsule bottom.

Drawing no. 43 shows the closed capsule containing the dose

In the drawings, each detail is indicated as follows:

1 indicates the rotating tower of the capsule filling machine

2 indicates the product to be filled which gather in the peripheral parts due to the centrifugal force

3 indicates the plurality of dosing devices distributed in the peripheral part of the rotating tower

4 indicates the same plurality of pistons

4 VACUUM indicates the dosing piston to work with granules/pellets, which is equipped with the internal cannula for the VACUUM aspiration

5 indicates the bushing in which the doses of the product to be packed are inserted

- 6 indicates a contrast disc for the pressing of the doses
- 7 indicates a feeding device of empty capsules
- 8 indicates a device to orientate the capsules placing the bottom down and the opening up
- 9 indicates a bushing in which move the capsules with bottom down
- 10 indicates a bushing to transfer the empty capsule bottoms towards the filling station and to move them back to the closing and ejecting station when full.
- 11 indicates an aspirating bar to separate the empty capsule bottom from the capsule top cap
- 12 indicates the central channel to feed the product to be packed in the rotating tower
- I, II, III, IV schematically indicates the concentric circumferences along which the different operating devices are distributed

Analysing the drawings from no. 21 to no. 38, which show the same capsule filling machine equipped for granules/pellets packing, it is possible to notice that the dosing piston no. 4 has been replaced with the new device no. 4 VACUUM. This device works by aspiration and sets the quantity of granules/pellets which is introduced and kept inside the suitably positioned dosing device no. 3. Then, moving down, the same piston no. 4 VACUUM transfers the dose inside the capsule bottom, which follows its production cycle, as per the above description referred to drawings from no. 1 to no. 18

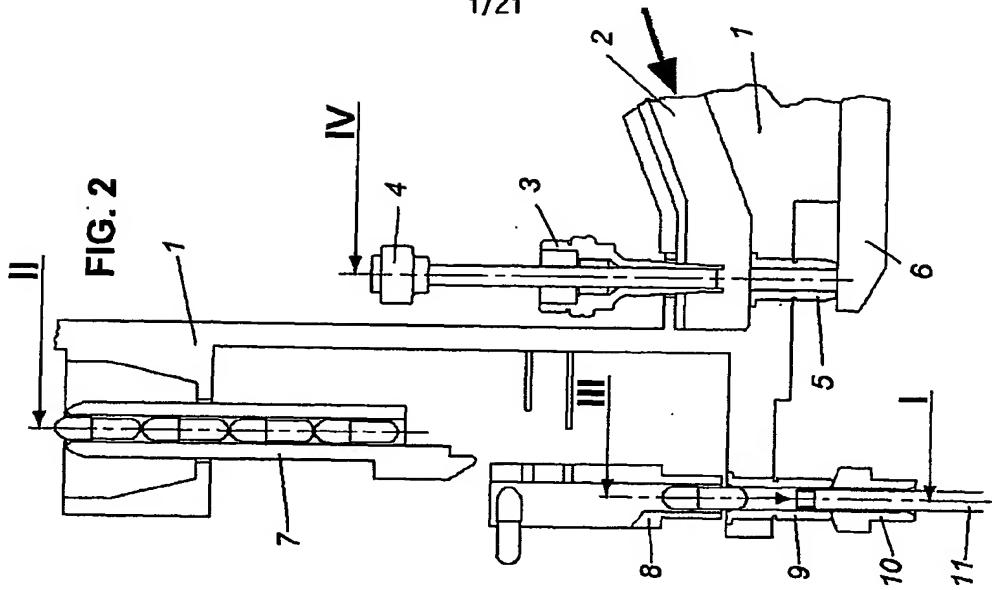
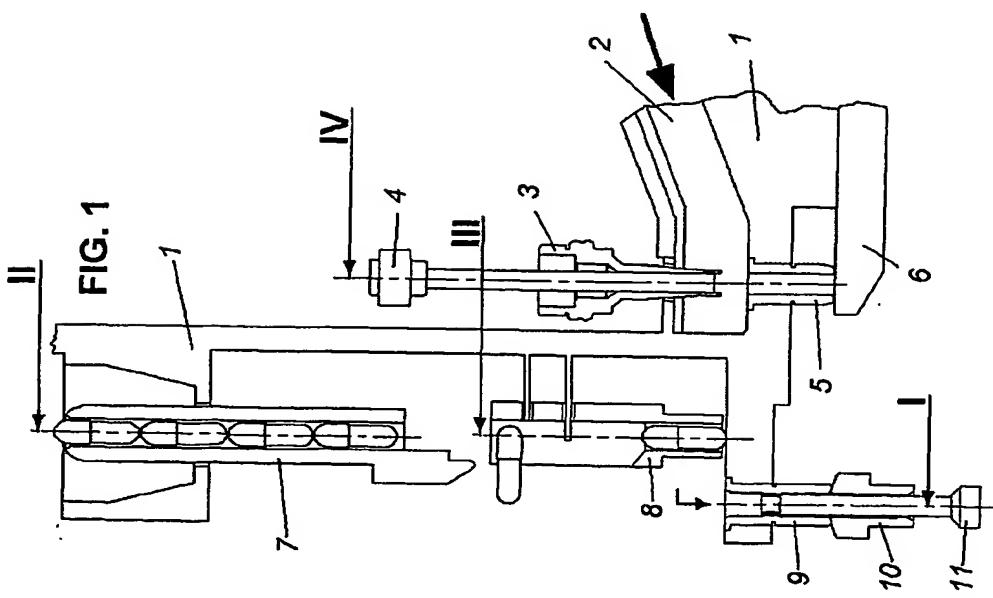
Of course, the invention is open to several different variations in the practical realisation to conform to the different specific technological requests of the product to be packed.

Therefore, the field of protection of the present invention will include the capsule filling machines that can be equipped with the different dosing devices to handle powder/herbs or granules/pellets, having the characteristics that have been described, illustrated and claimed afterwards.

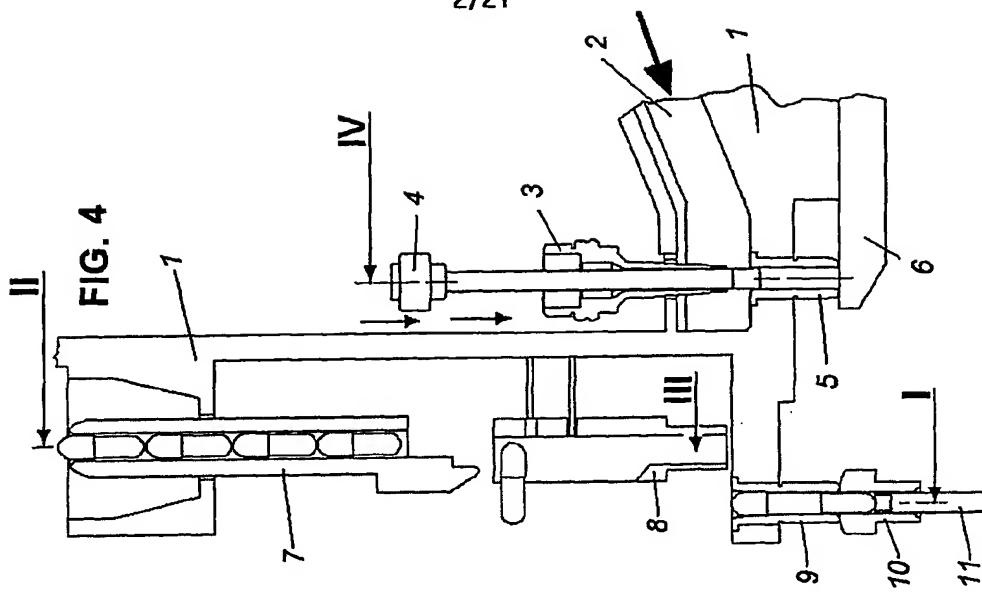
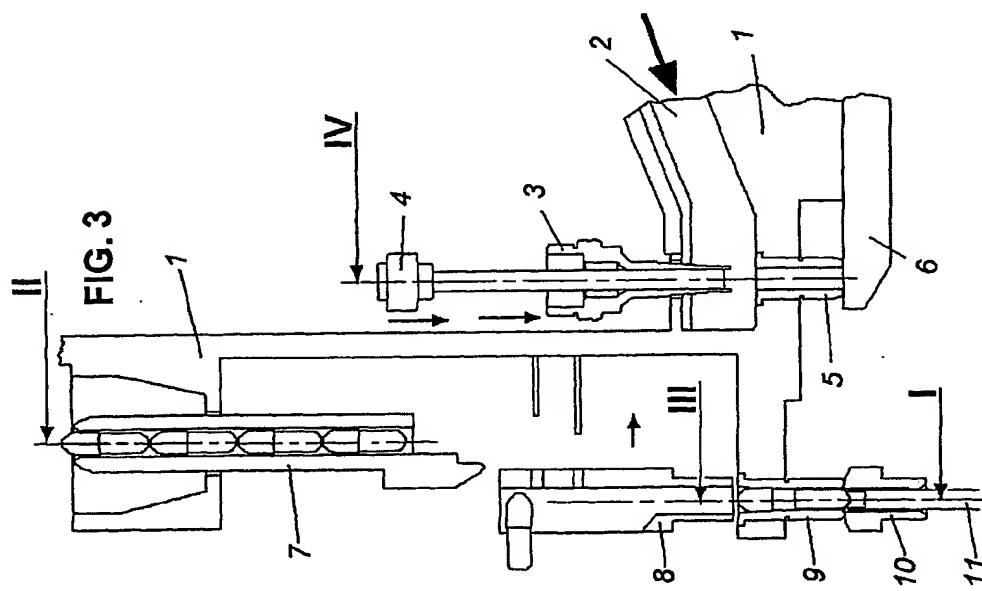
**CLAIMS**

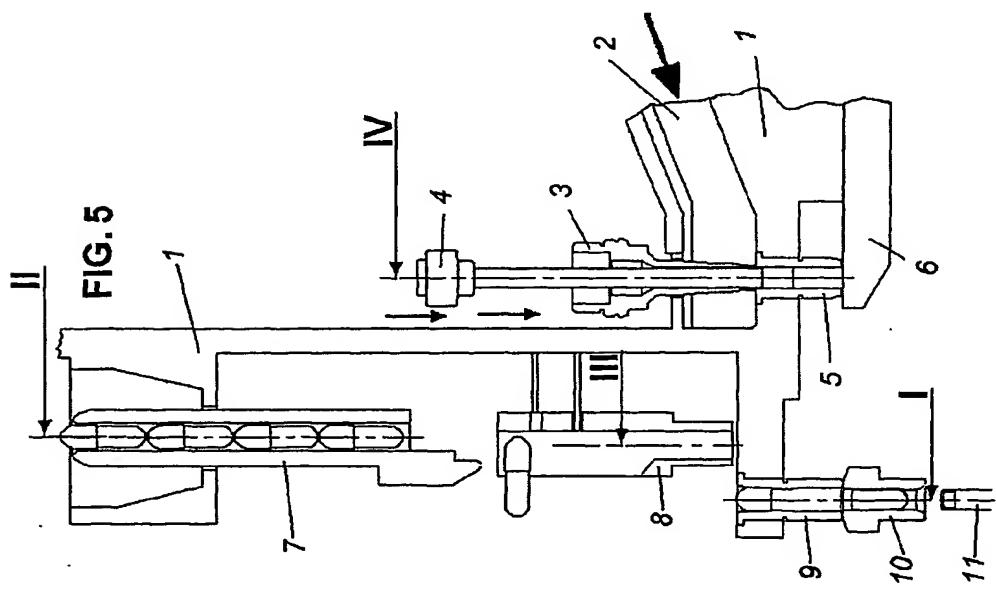
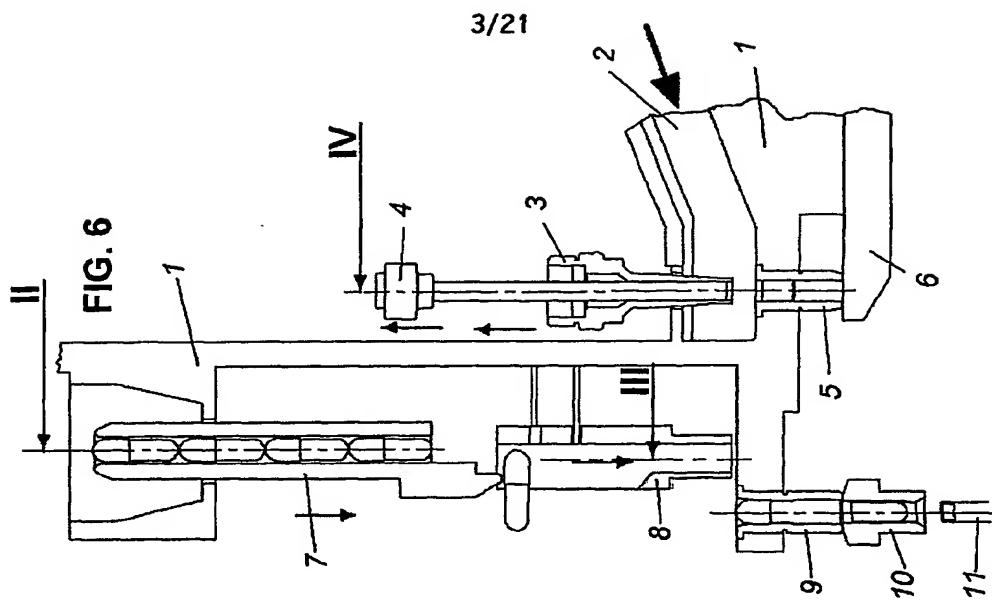
1. Capsule filling machine CHARACTERIZED BY THE FACT THAT the products to be filled into the capsules (2) are fed hermetically from the inside of the rotating tower (1) and are pushed in the withdrawing area of the dosing devices (3; 4; 5) by the centrifugal force
2. Capsule filling machine, as per claim no. 1, CHARACTERIZED BY THE FACT THAT the layer of the product to be packed (2) in the peripheral withdrawal area has a reduced height and consequently it is possible to pack also minimum product quantities.
3. Capsule filling machine, as per the previous claims, CHARACTERIZED BY THE FACT that the dosing devices (3; 4) while working are always immersed in the layer and that they do not emerge from it even during the discharging phase of the dosed quantities
4. Capsule filling machine, as per the previous claims, CHARACTERIZED BY THE FACT that the dosed products (2) come out from the capsule bottom of the rotating layer and are inserted, without being compressed, in the proper bushing below
5. Capsule filling machine, as per the previous claims, CHARACTERIZED BY THE FACT that the dosed products inserted in the bushing (5) can be compressed in it by mean of a dosing piston (4) in contrast with the disc below (6)
6. Capsule filling machine, as per the previous claims, CHARACTERIZED BY THE FACT that the bushing (5) is positioned under the peripheral layer (2) of the rotating tower (1)
7. Capsule filling machine, as per the previous claims, CHARACTERIZED BY THE FACT that the bushing (10) position the capsule bottoms to be filled under the bushing (5) in line with the dosing piston 4 which realises the product transfer.

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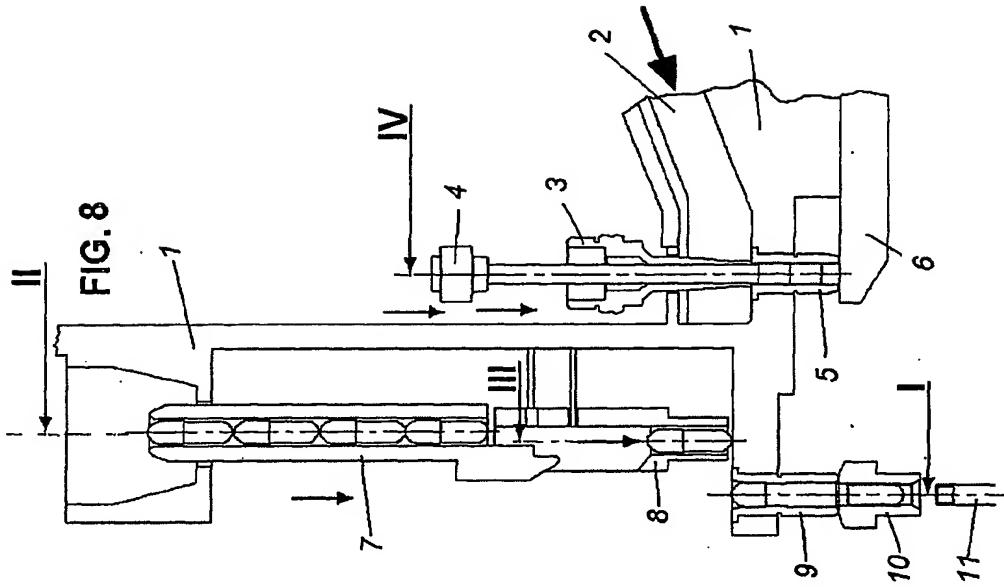
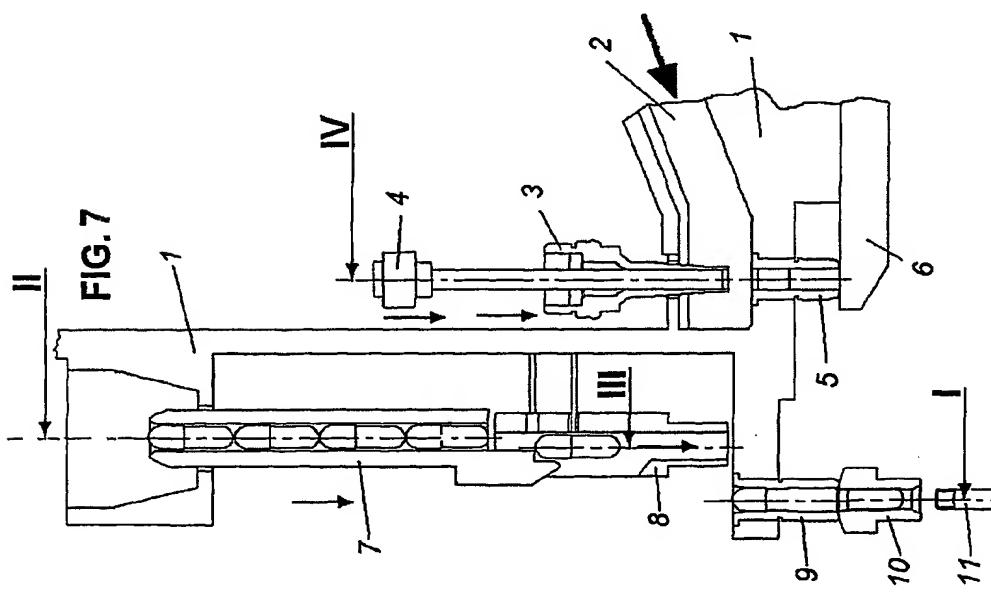
**FIG. 2****FIG. 1**

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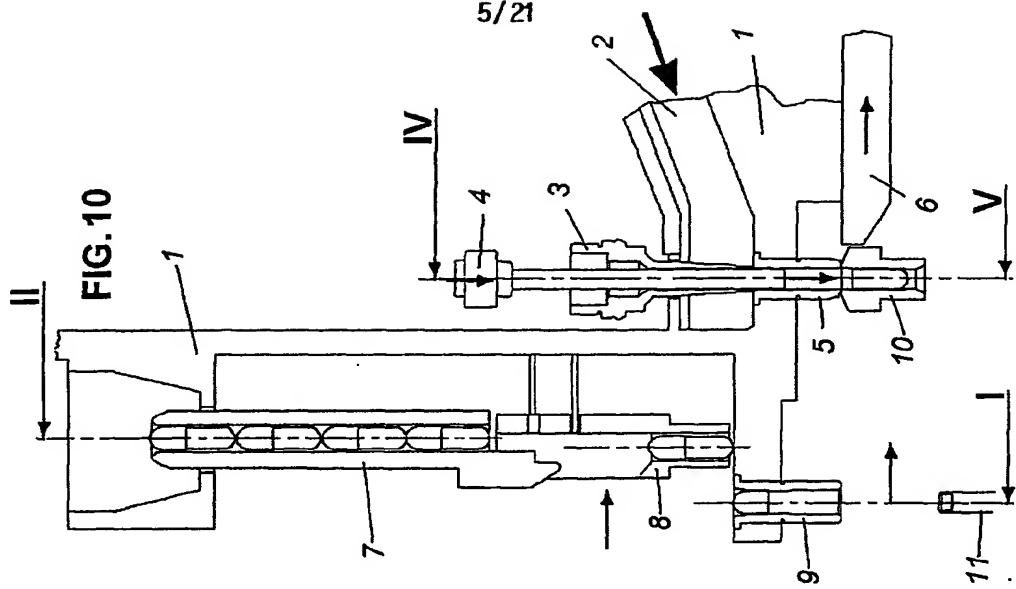
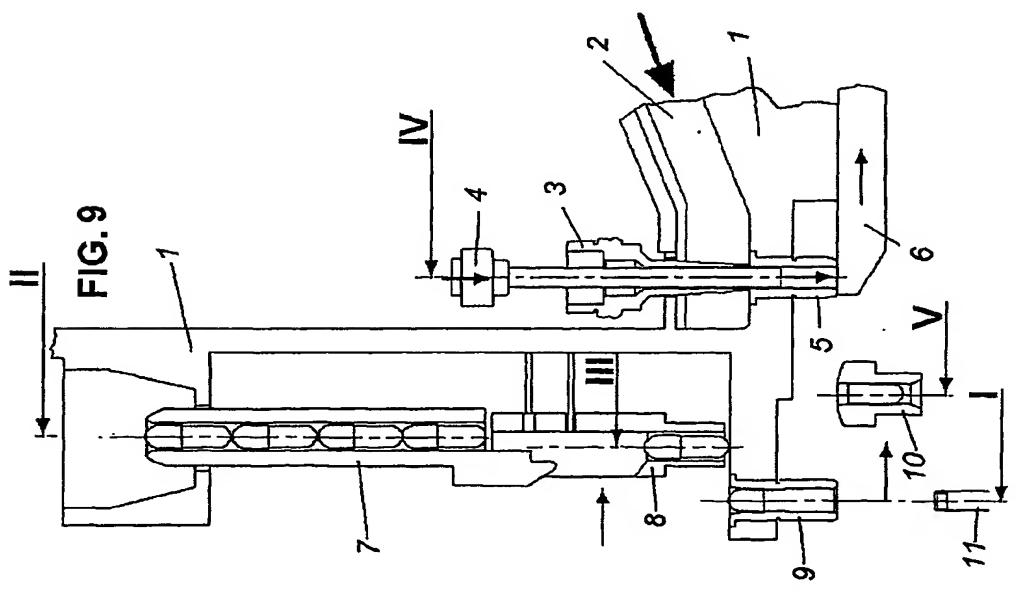
**FIG. 4****FIG. 3**

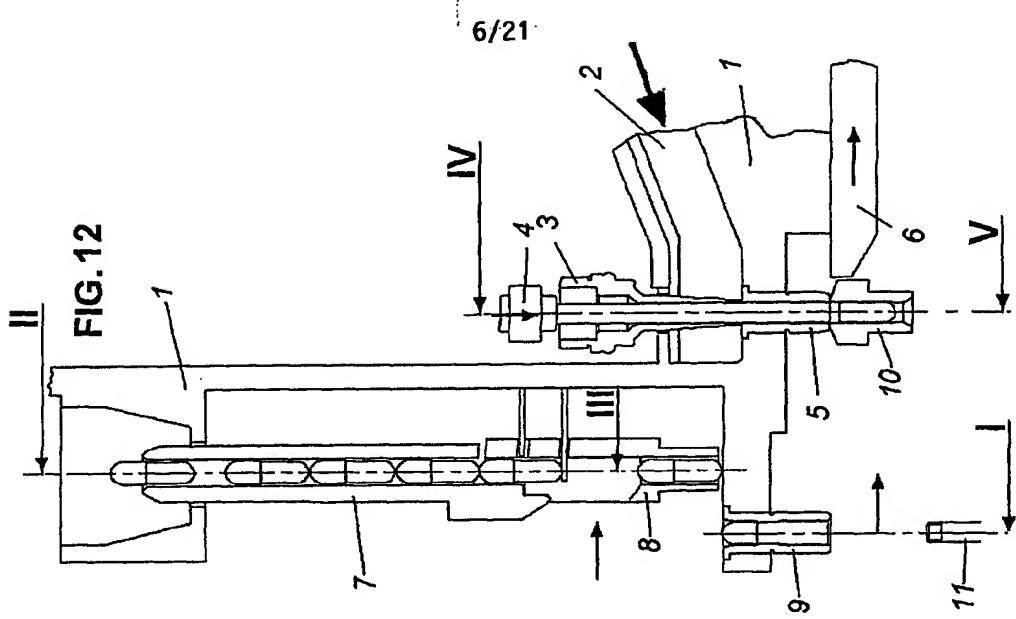
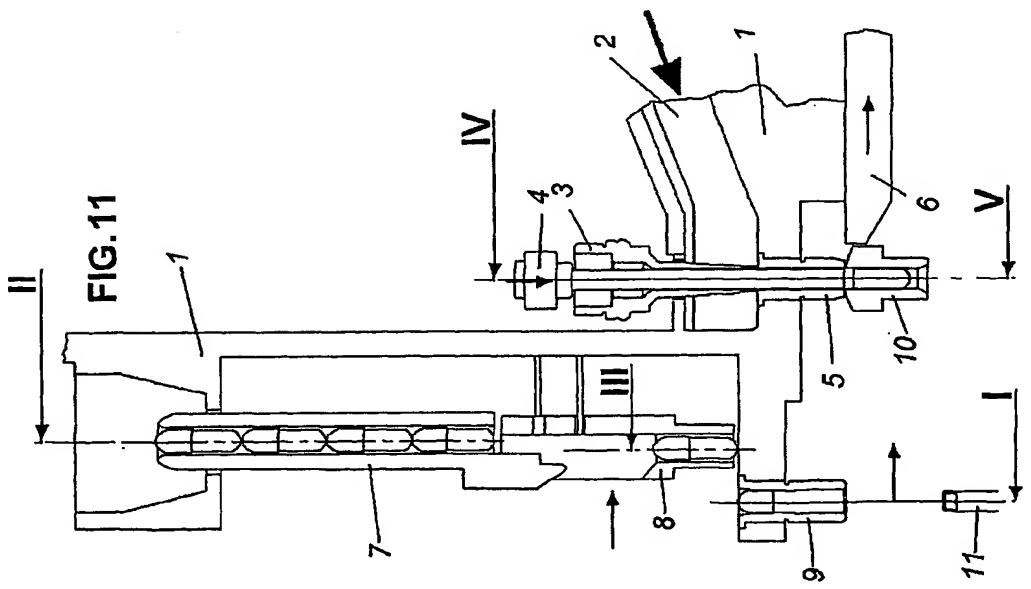


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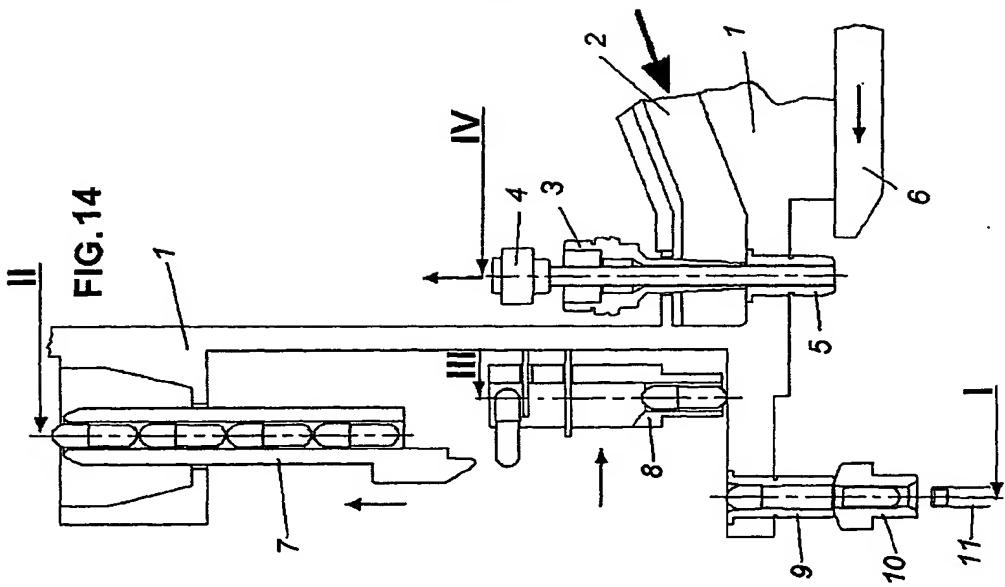
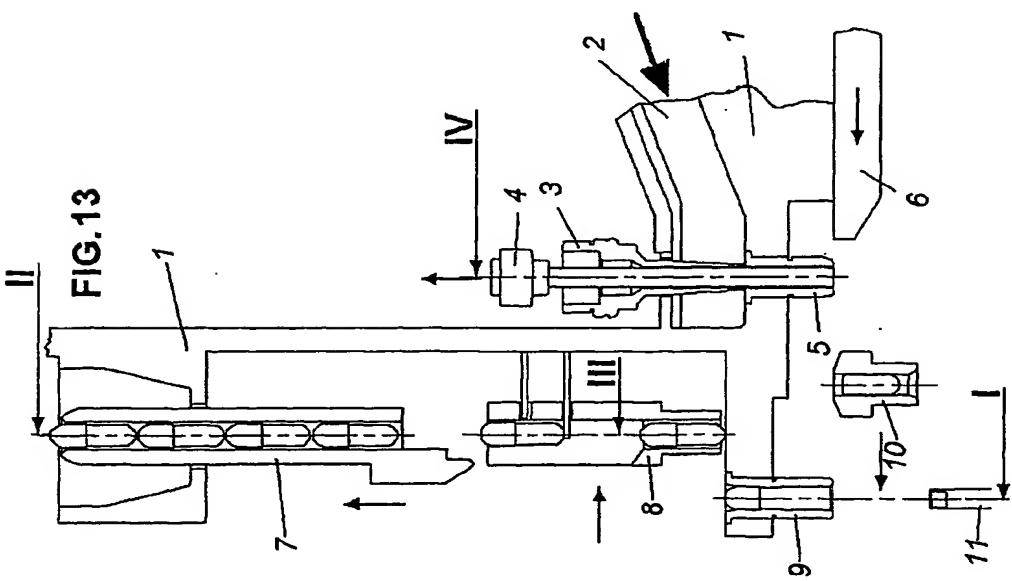
**FIG. 8****FIG. 7**

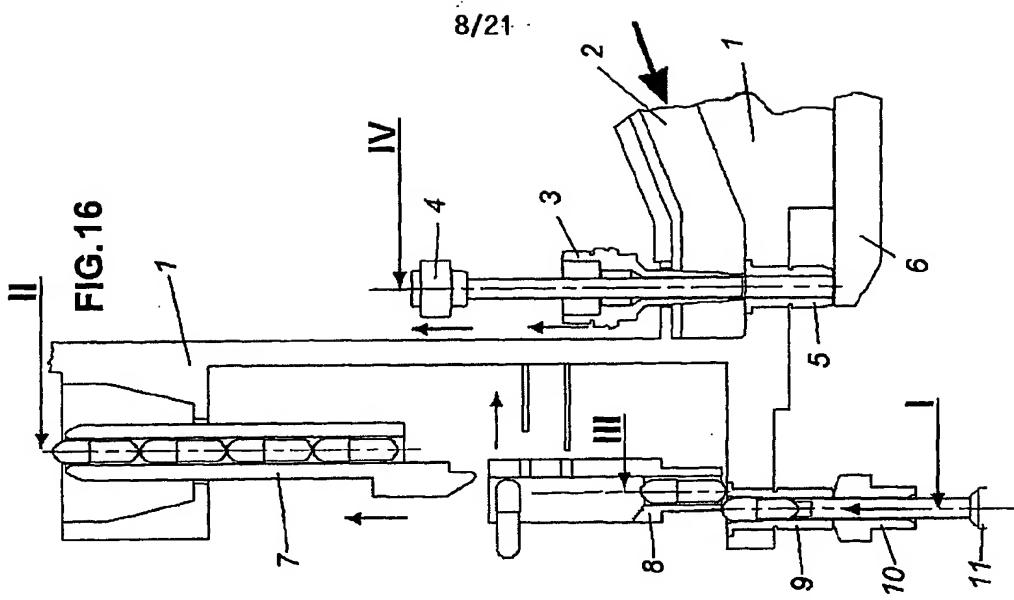
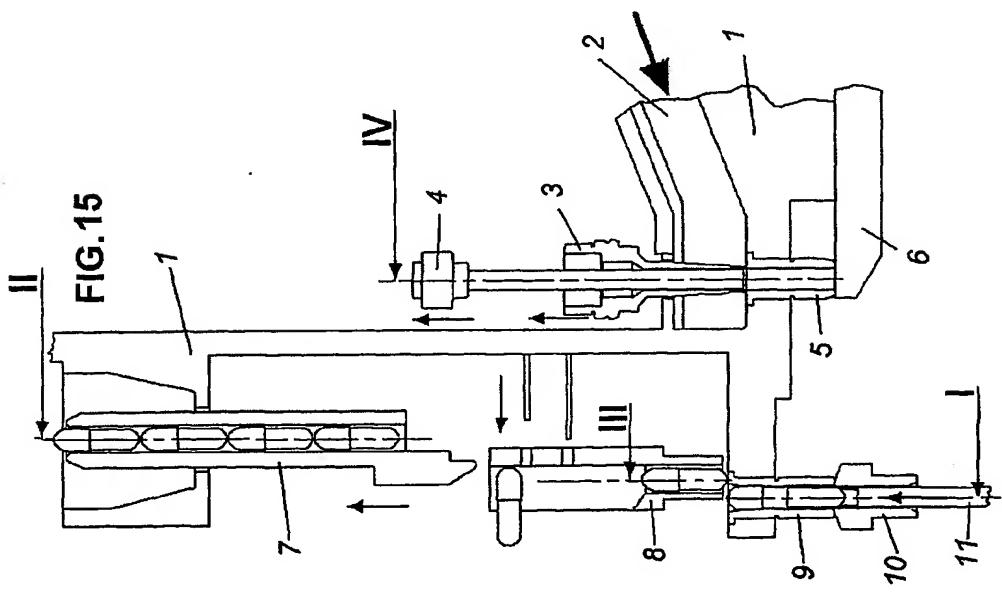
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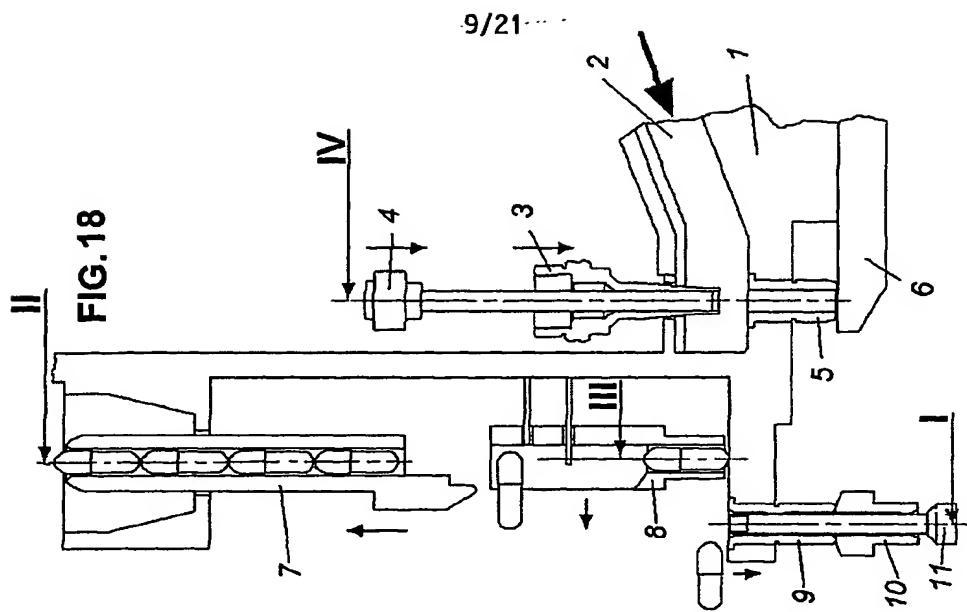
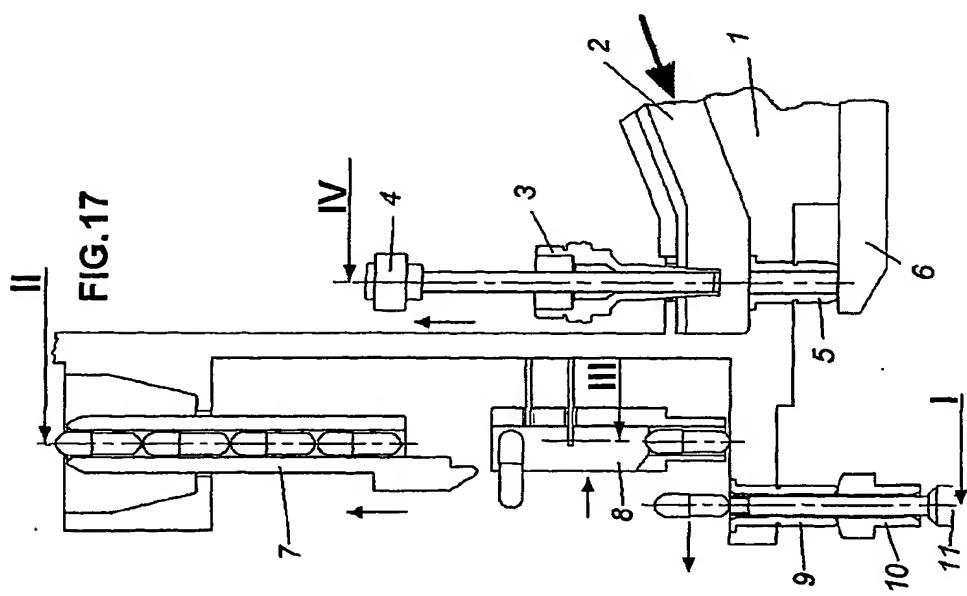
**FIG. 10****FIG. 9**

**FIG. 12****FIG. 11**

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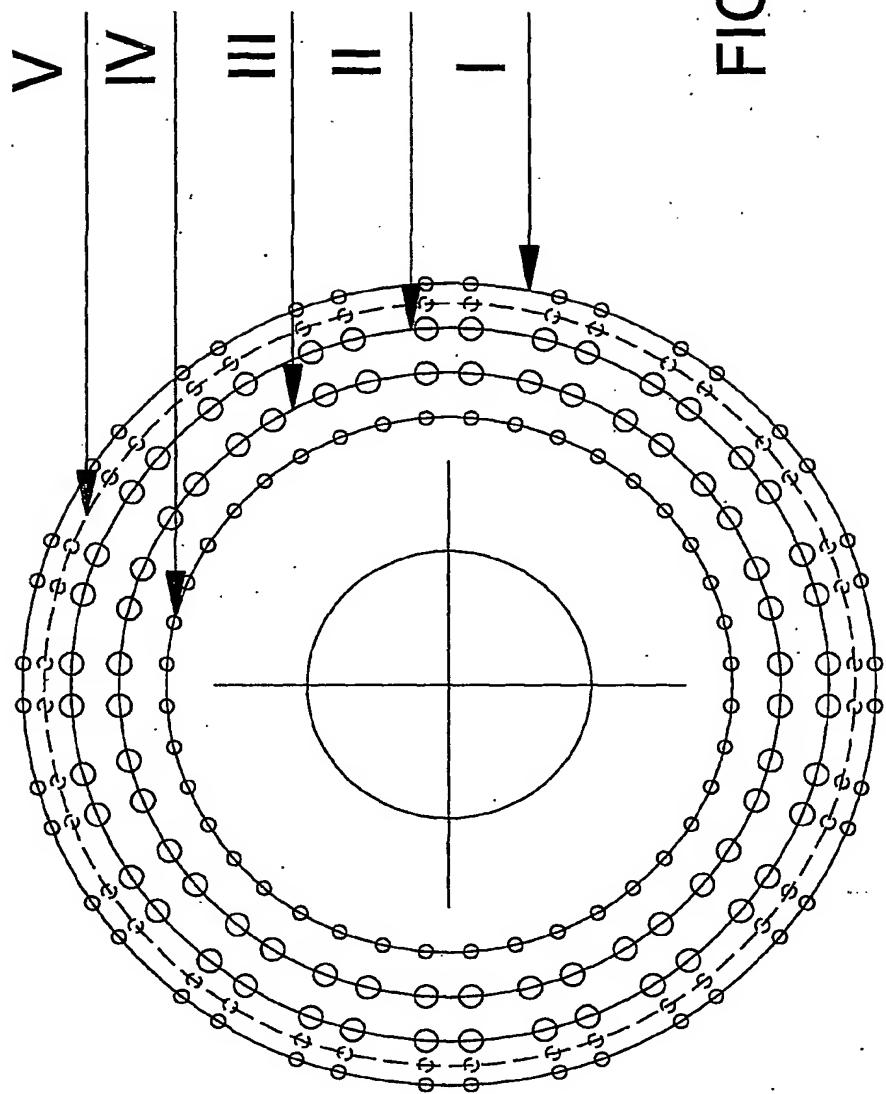
**FIG. 14****FIG. 13**

**FIG. 16****FIG. 15**

**FIG.18****FIG.17**

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FIG. 19



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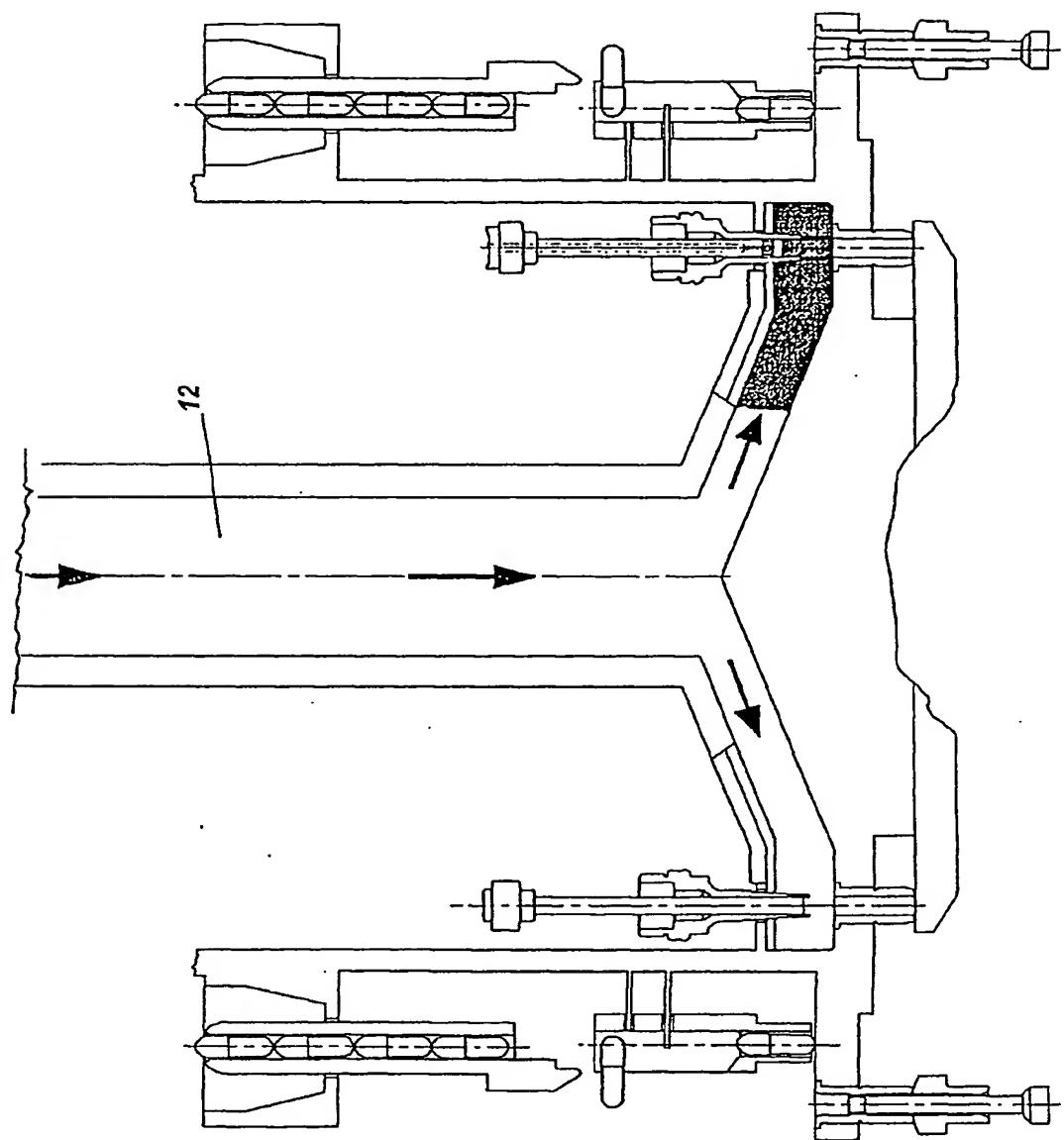
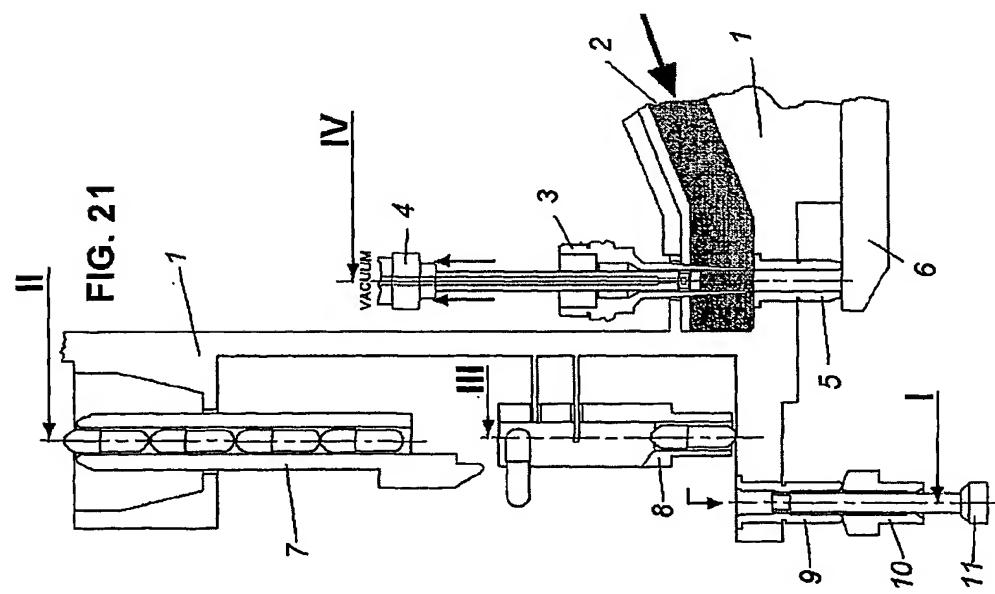
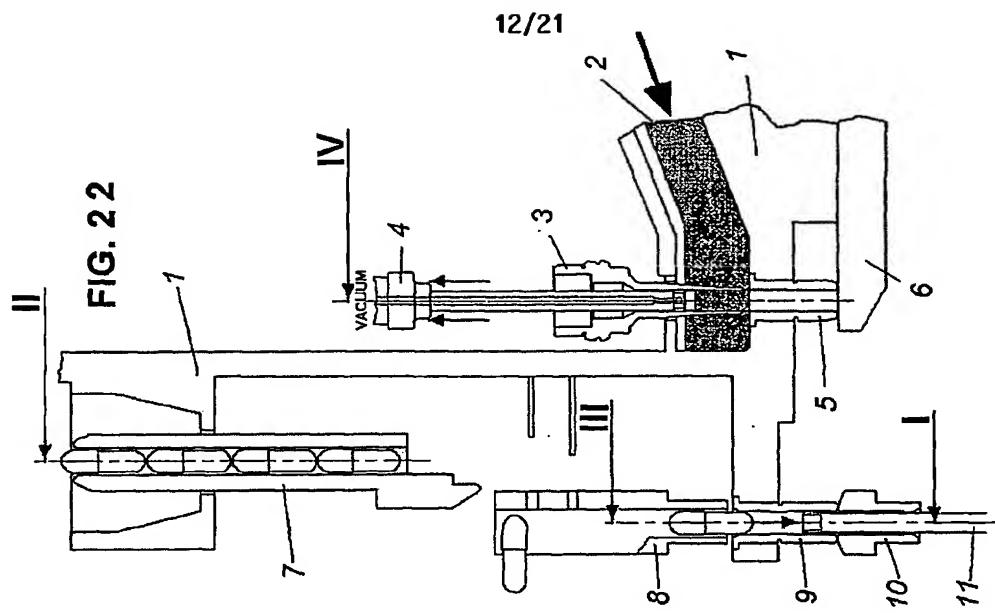
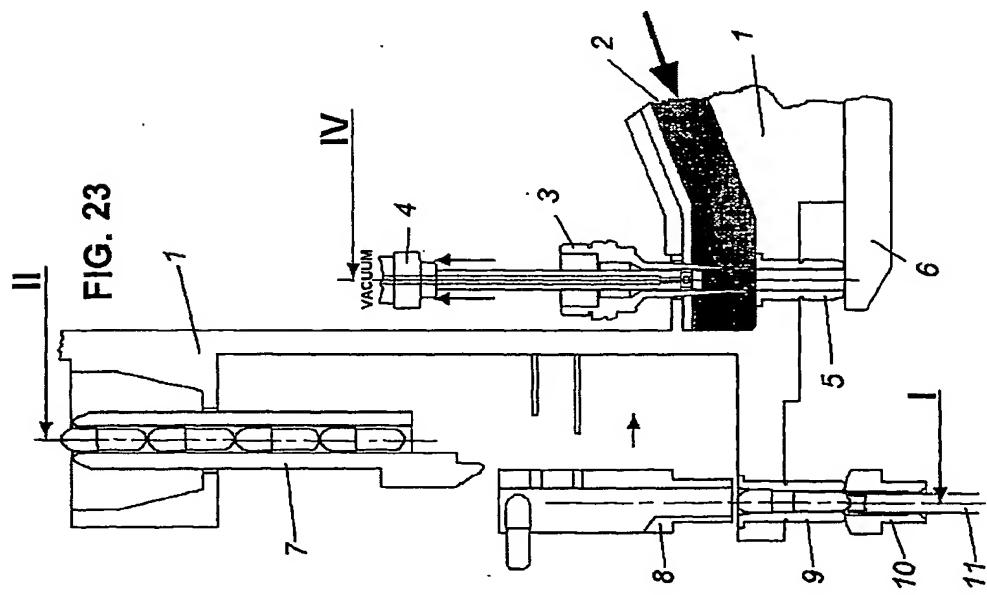
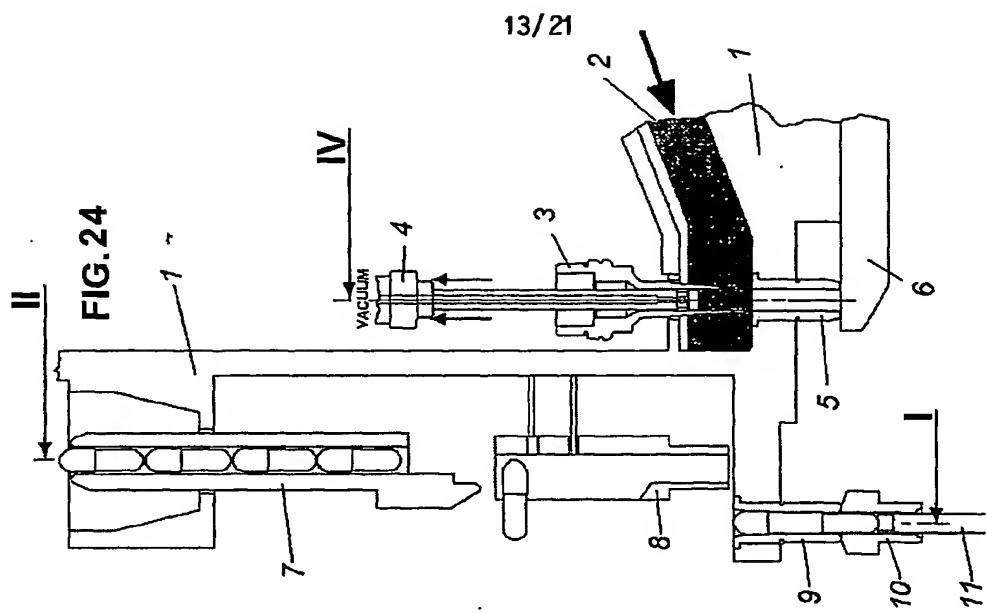
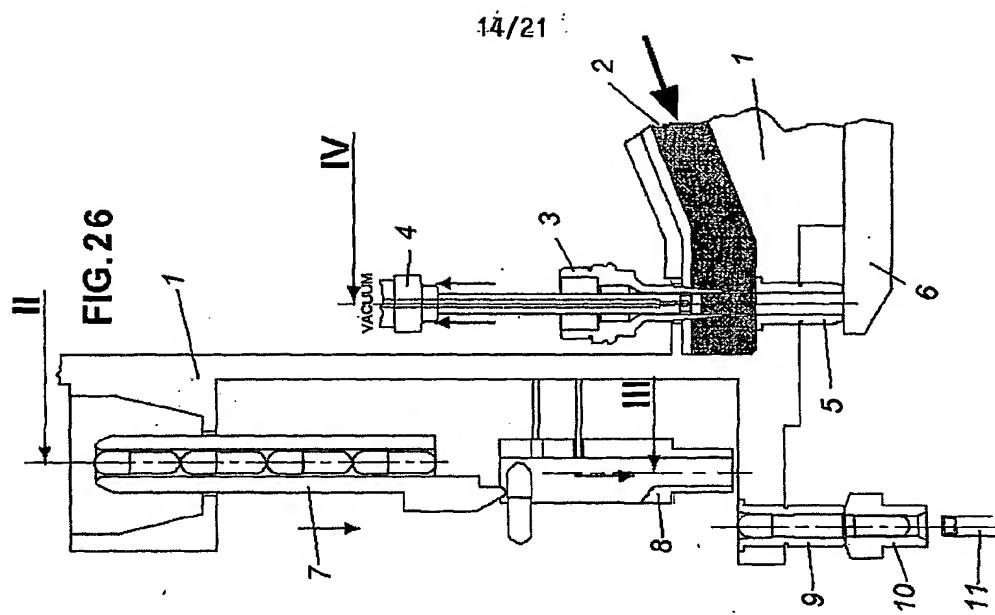
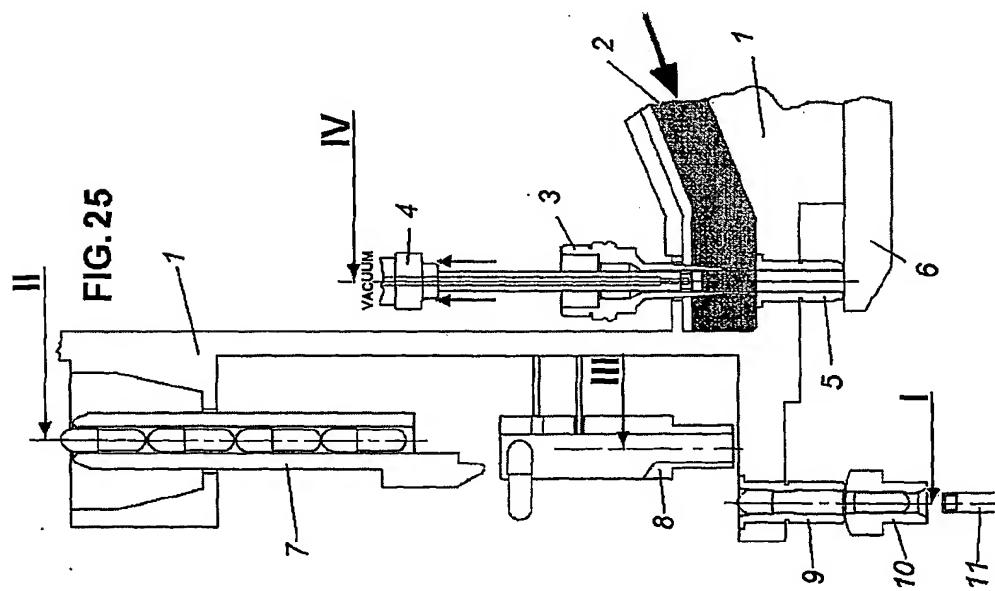


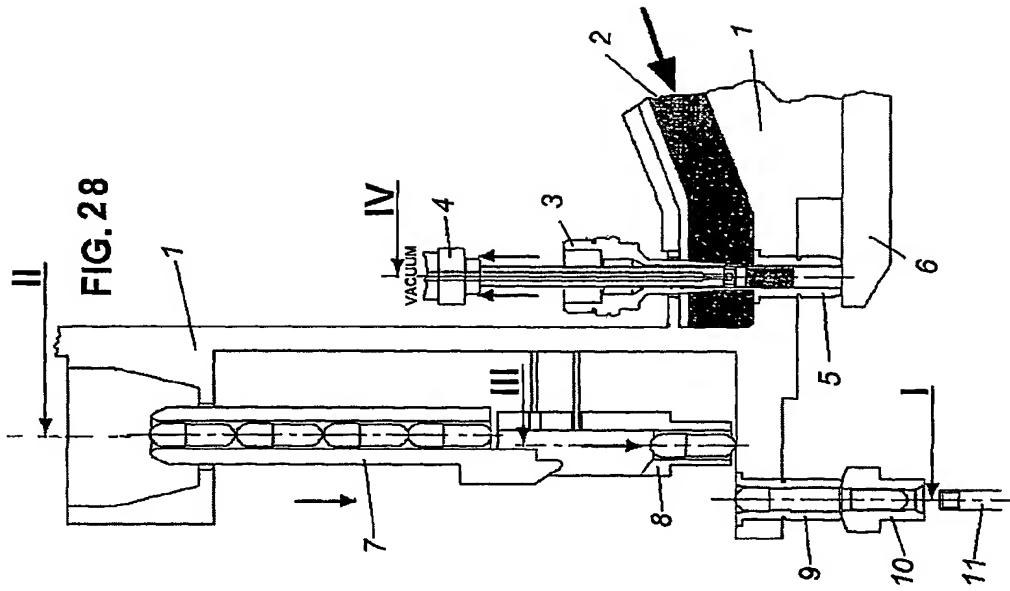
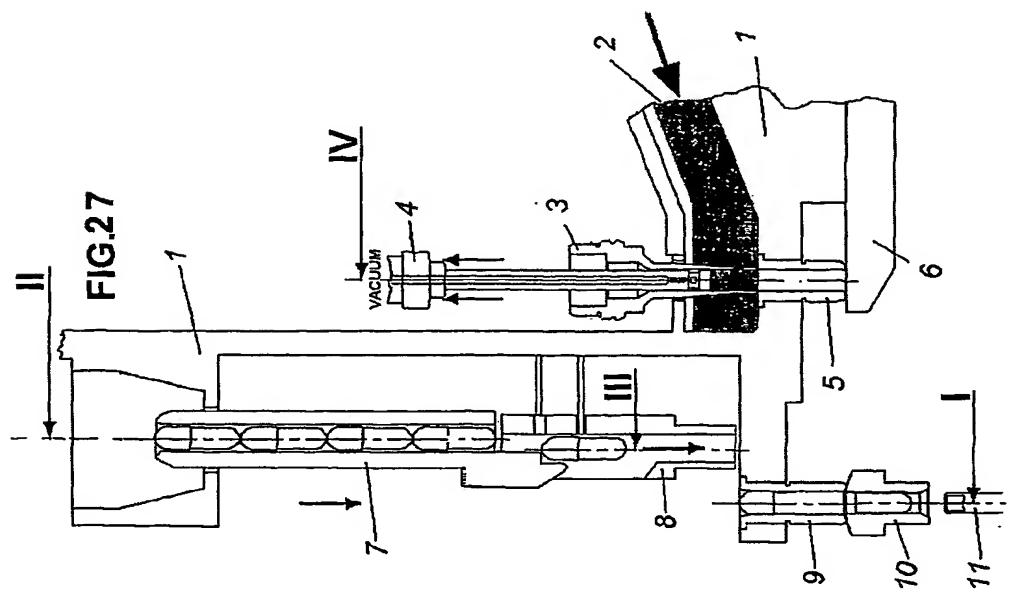
FIG. 20

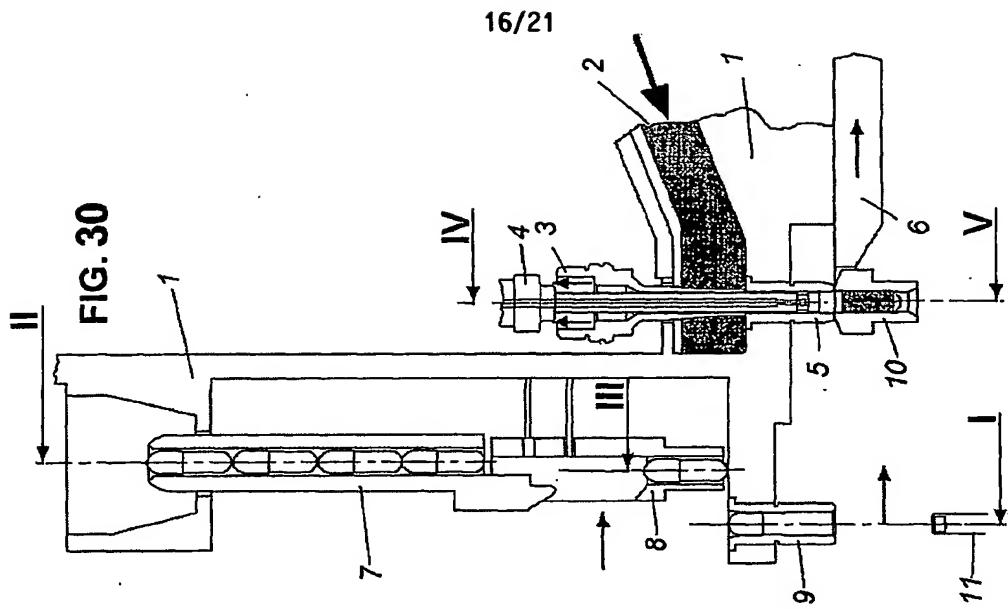
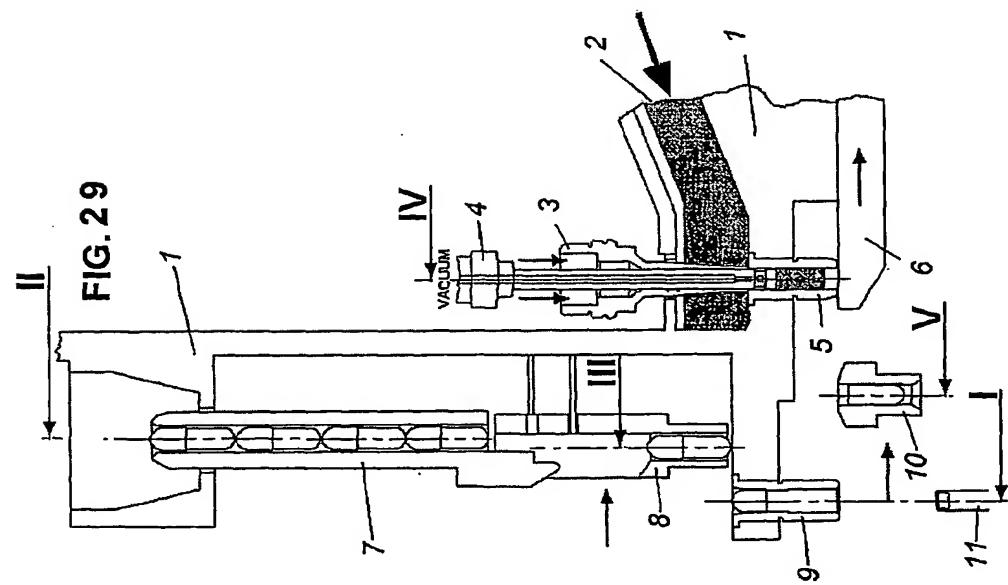


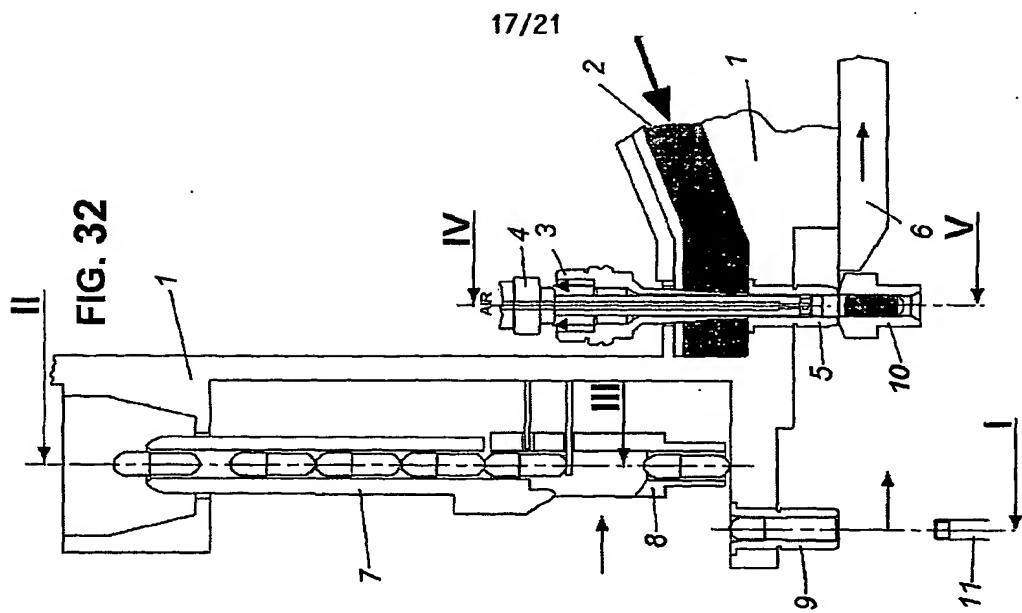
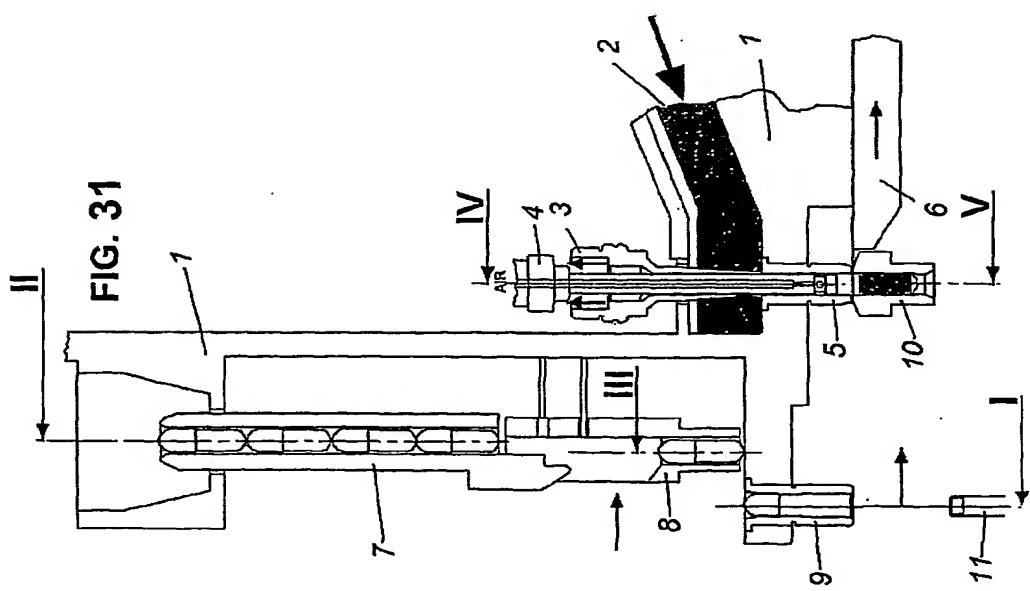


**FIG. 26****FIG. 25**

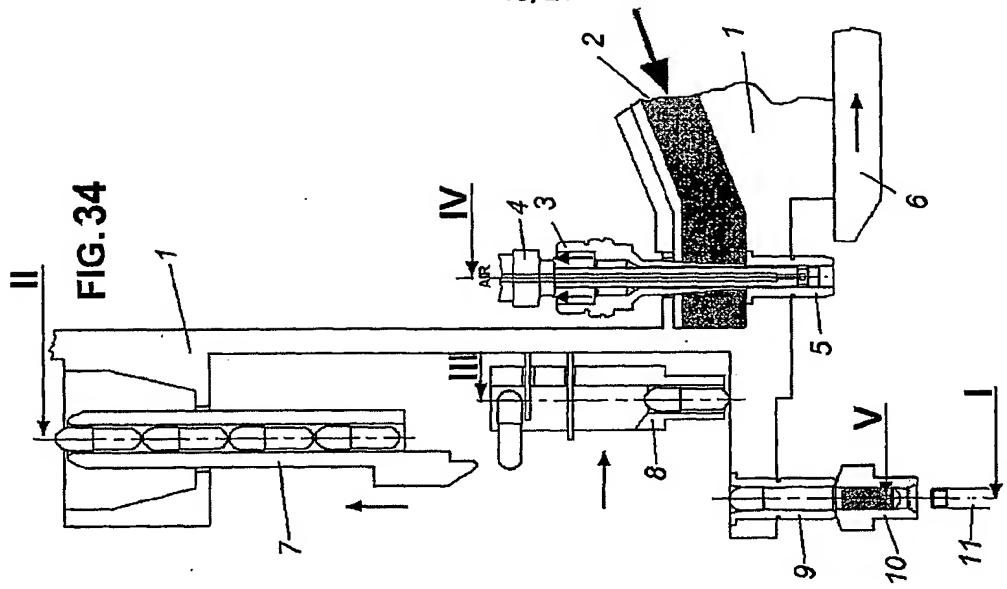
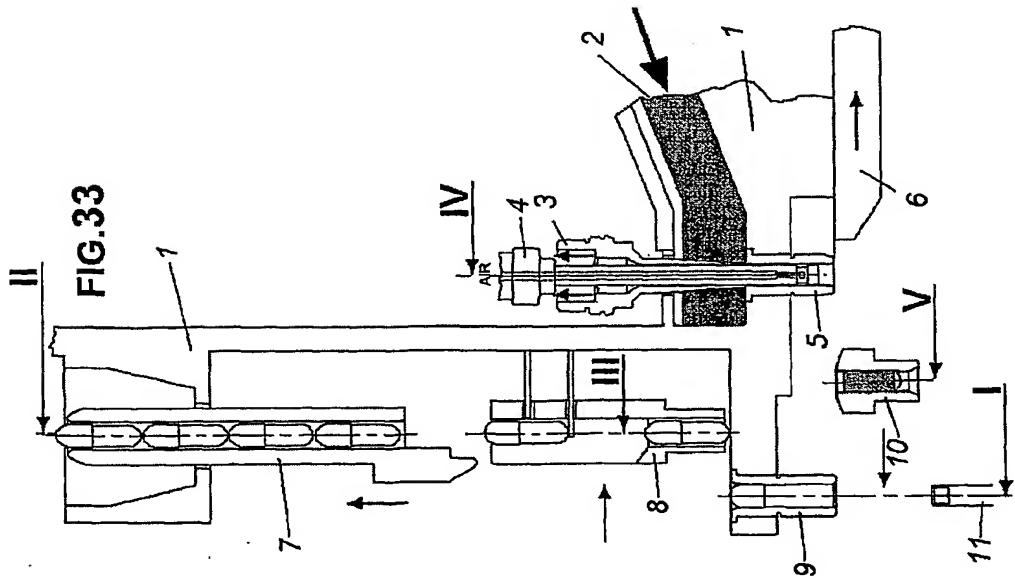
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**FIG. 28****FIG. 27**

**FIG. 30****FIG. 29**

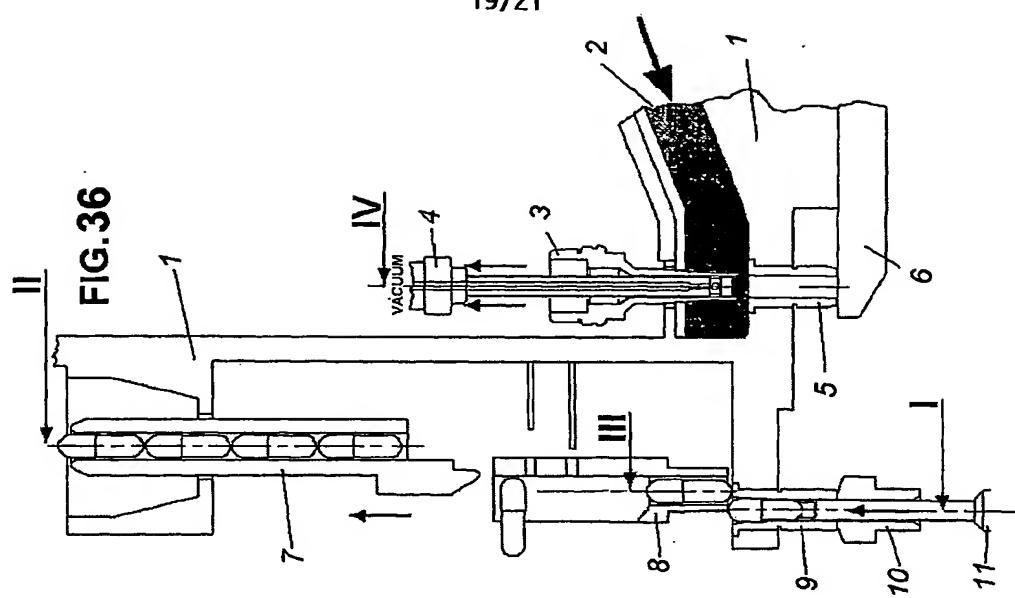
**FIG. 32****FIG. 31**

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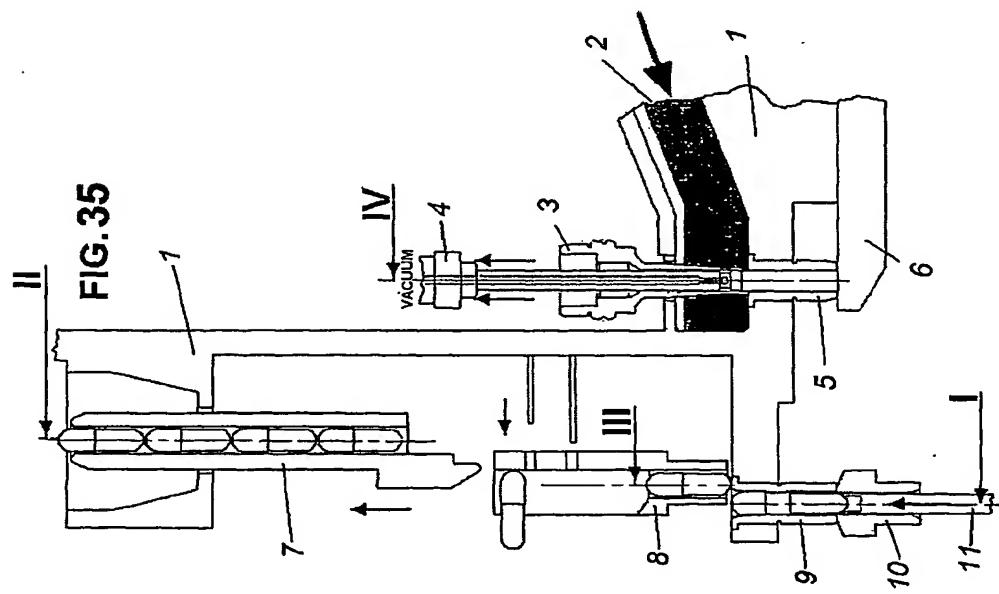
**FIG. 34****FIG. 33**

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II  
FIG. 36

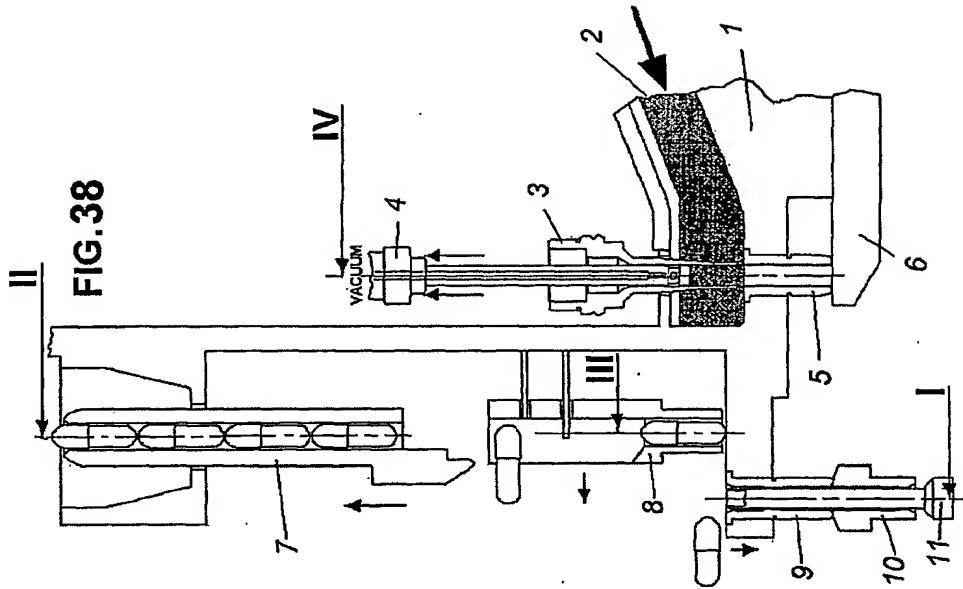


II  
FIG. 35

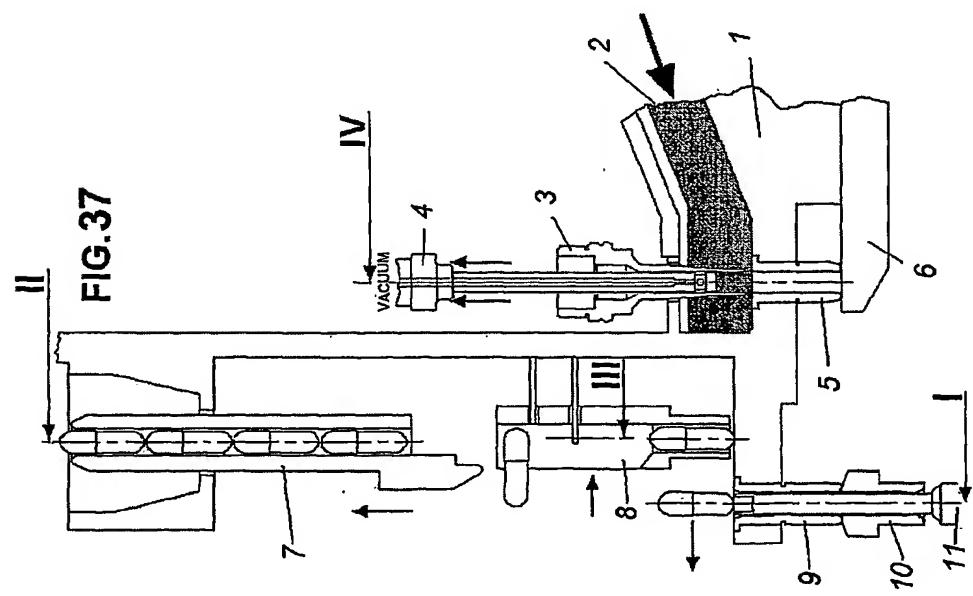


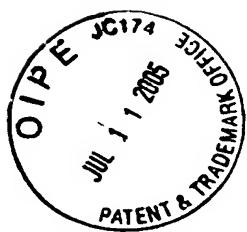
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II  
IV  
FIG.38



II  
IV  
FIG.37





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FIG 43



FIG 40

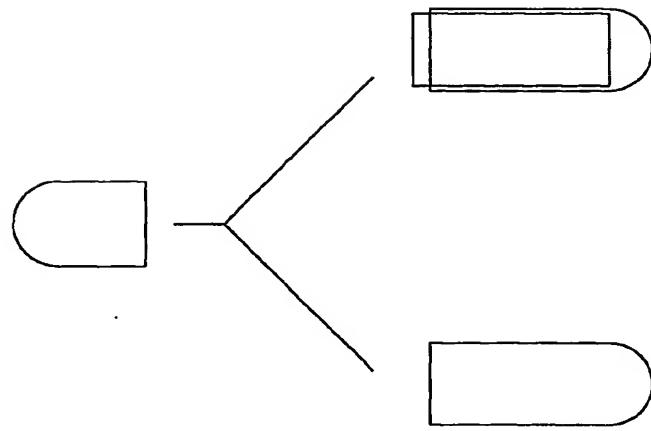


FIG 42

FIG 41



FIG 39